

## ABSTRACT OF THE DISCLOSURE

A thin-film crystal wafer having a pn junction includes a first crystal layer of p GaAs, a second crystal layer of n  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{P}$ , the first and second crystal layers being lattice-matched layers that form a heterojunction, and a control layer of a thin-film of  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{P}$  differing in composition from the n  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{P}$  of the second crystal layer is formed at the interface of the heterojunction. The control layer enables the energy discontinuity at the interface of the  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{P}/\text{GaAs}$  heterojunction to be set within a relatively broad range of values and thus enables the current amplification factor and the offset voltage to be matched to specification values by varying the energy band gap at the heterojunction.